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ARIZONA MEDICINE
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Original ARTICLES

ONE HUNDRED AND ELEVEN SURGICAL LESIONS OF THE STOMACH

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This study of one hundred eleven surgical lesions of the stomach treated in our private practice since January of 1946 was carried out primarily to evaluate the present trend toward a more aggressive approach in treating cancer of the stomach. In this presentation the conditions necessitating operation on the stomach will be enumerated and the personal feeling of one of us (K.C.S.) toward chronic gastric ulcer will be presented for discussion. We shall also attempt to evaluate, from statistics evolved in treating this series of cases, the technical improvements that should extend the operability of cancer of the stomach.

TABLE 1—Conditions for which Operation Was Performed

Hypertrophic Pyloric Stenosis	8
Diverticula	2
Gastric Ulcer	40
Gastro-Jejunal Ulcer	10
Gastritis	2
Malignancies	43
Benign Tumors	4
Foreign Bodies	2
Total	111

Table 1 lists the conditions for which operation on the stomach was performed. There were eight patients with hypertrophic pyloric stenosis and two with gastric diverticula. Forty patients were operated upon for chronic gastric ulcer and ten individuals required operation for gastrojejunal ulceration. A stomach operation was performed upon two persons with gastritis. Significantly, forty-three or 38.7% of the patients in this series had a gastric malignancy, of which thirty-eight were carcinoma, two leiomyosarcoma, two lymphosarcoma, and one pationt had a hemiangioendothelioma. Four benign tumors of the stomach were encountered, one of these was a solitary polyp, one was polyposis en nappe and there were two benign leiomyomata. There were two foreign bodies in this series both of which produced symptoms of sufficient severity to make surgical intervention mandatory. In one instance an open safety pin was found at operation. The other interesting foreign body was a large trichobezoar filling the stomach of a four and one-half year old child.

Table 2 lists the operative procedures used in attempting to correct the preceding pathological conditions. Eleven patients died in the hospital making the overall operative mortality 9.9%. A breakdown of the mortality will be further considered in another phase of this presentation.

TABLE 2—Operative Procedures

Subtotal Gastrectomy	62
Total Gastrectomy	13
Pyloromytomy	8
Laparatomy Only	6
Takedown and Subtotal Resection	5
Vagotomy	5
Local Excision of Tumor	3
Diverticulectomy	2
Posterior Gastro-enterostomy	2
Enterostomy	2
Gastrotomy	2
Vagotomy Ligation Left Gastric Artery Repair Hiatus Hernia	1
Total	111

Read before the Southwestern Surgical Congress Section of the Sixtieth Annual Meeting of the Arizona Medical Association, Inc., Tucson, Arizona — April 30, 1951.

CHRONIC GASTRIC ULCER

We believe that cancer can develop in a chronic gastric ulcer just as it does in a skin ulcer or chronic ulcer in other parts of the body. Differences of opinion exist regarding whether or not a chronic gastric ulcer becomes malignant or was malignant from the onset. Abrahamson and Hinton(1) have followed one hundred sixty-five cases of gastric ulcer over periods of one to nineteen years and have failed to find a single case in which the transformation from a benign ulcer to a gastric neoplasm could be proved. That cancer occasionally develops in a gastric ulcer is generally recognized.

It is apparent that the percentage of error (10.1% to 19.8%; and 11.6% in this series) in mistaking a gastric cancer for a benign ulcer is greater than the surgical mortality for subtotal gastrectomy when used for treating chronic gastric ulcer. (Table 3). Thus we believe that, with a very few exceptions, all gastric ulcers should be considered surgical problems. Whether the lesion is malignant from its onset or has become malignant is not the important factor.

TABLE 3—Mortality Patients Treated For Chronic Gastric Ulcer

	Patients	Died	Mortality
Vagotomy	1	0	0
Vagotomy Ligation Left Gastric Artery	1	0	0
Subtotal Gastrectomy	38	1	2.6
Total Operations	40	1	2.5

Technical Improvements That May Be Factors In Extending Resectability of Cancer of the Stomach

Past statitsics indicate that the surgical treatment of cancer of the stomach leaves a great deal to be desired. They can be improved only by earlier diagnosis and by more extensive excision of the cancer bearing portion of the stomach and contiguous structures when the condition is encountered in the operating room. No gastric malignancy in this series was diagnosed before symptoms appeared. Gastroscopy has been very valuable in orienting us as to the type of lesion with which we were dealing. Advantage was taken of this adjunctive diagnostic procedure in nineteen instances. In this small group the gastroscopist discovered two malignant tumors not demonstrable by careful roentgenologic examination. He labeled two tumors malignant that the radiologist thought were benign ulcers and, in addition, pronounced a tumor malignant that the pathologist considered benign. Subsequent events proved that the controversial lesion was malignant. The gastroscopist erred one time in calling a malignant ulcer benign, although exploration was advised because of the location of the lesion.

TABLE 4—Mortality Patients Treated For Gastric Mortality Malignancies

	Patients	Died	Mortality
Laparatomy	6	2	33.3
Palliative Procedures			
Posterior Gastro-enterostomy	2	0	00.0
Enterostomy	2	2	100.0
Resection			
Subtotal	22	2	9.9
Total	12	3	25.
	43	9	20.9

Table 4 shows the overall operative mortality in the forty three malignancies treated by surgical measures.

It is believed that the five year survival rates will be materially increased over past statistics because a higher percentage of patients were given the advantage of resection. The following technical improvements that have made this possible warrant some discussion.

1. The thoracic and abdominothoracic incision with the improvements in anesthesia which have made this approach possible.
2. Total gastrectomy.
3. The resection of organs close to the stomach when invaded by the malignant process.

When one considers that from 30% to 50% of all carcinomas of the esophagus occur in the lower one-third of this organ and that 25% (this series) of all carcinomas of the stomach are near or invade the cardia, the value of the thoracic and abdominothoracic approach becomes obvious. Prior to the advent of this incision these lesions were considered inoperable and the patient relegated to the hopeless category. The thoracic or abdominothoracic approach was utilized sixteen times in treating the malignant lesions of the stomach in the group being reviewed.

Total gastrectomy, as advocated by Longmire(2) has undoubtedly increased the range of operability of cancer of the stomach and should have a favorable effect upon future survival statistics. It is believed that in large lesions (Figure 2) and especially in malignancies

FIGURE 1. Cancer of the stomach occurring in a patient with a twenty-five year history of ulcer and an eight year roentgenologic diagnosis of chronic gastric ulcer.

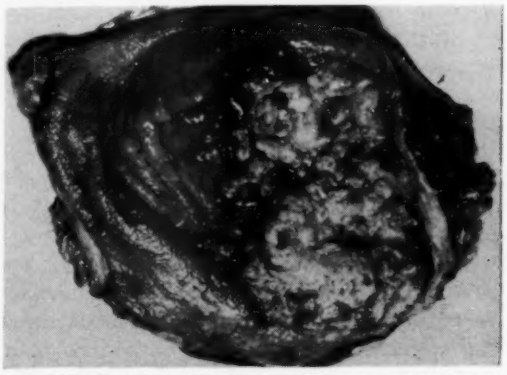

FIGURE 2. Large polypoid cancer of the stomach treated by total gastric resection.

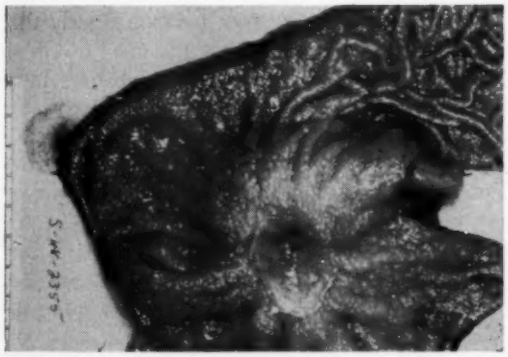

FIGURE 3. Cancer of the stomach near cardia—requiring total gastrectomy for removal.

near the cardiac end of the stomach (Figure 3) total gastrectomy is the operation of choice. In using this procedure however, one must remember that it carries a higher operative mortality and that many of the surviving patients will have a significant nutritional disturbance. The utilization of the Roux-Y esophagojejunostomy improves the mechanics of this operation and diminishes the likelihood of a leak at the line of anastomosis. Total gastrectomy was performed in twelve patients with gastric cancer. Three patients died in the hospital, a 25% operative mortality. Three are still alive, but only one of these has survived longer than two years.

The resection of organs close to the stomach when invaded by the malignant process in treating gastric cancer is mandatory if we are striving to achieve more than simple palliation for our efforts. We do not hesitate to remove a portion of the liver when it is invaded by continguity from carcinoma of the stomach. Frequently a large percentage of tissue in an apparently inoperable mass is inflammatory. It is generally conceded that the greater omentum should be removed in all malignant lesions of the stomach. We have resected a portion of the pancreas on occasions and have been favorably surprised at the low incidence of pancreatic fistulae following this procedure. If the malignant lesion invades the head of the pancreas, a more serious problem is encountered. One should weigh the operative mortality and the patient's future discomfort against the likelihood of a cure before removing this important segment of the organ. The spleen is seldom invaded by metastatic carcinoma, but its removal facilitates exposure of the gland bearing area around the stomach. Its removal when one is operating for gastric cancer should be routine. In this series a portion of the liver was removed with the stomach in four instances; a portion of the pancreas with the stomach on eight occasions; and a portion of the pancreas, colon and stomach in four instances. Of this group of sixteen patients four have survived as follows: one for six months, two for one and one-half years and one for four and one-half years.

SUMMARY

1. We have presented a brief review and evaluation of one hundred eleven surgical lesions of the stomach treated since January 1946.

2. Tables 1 and 2 show the types of lesions found and the Operations performed.

3. The importance of gastroscopy in evaluating gastric lesions is stressed.

4. Technical improvements that may aid in extending resectability of gastric carcinoma have been discussed.

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ROENTGEN AND BIOCHEMICAL CHANGES IN PANCREATIC CARCINOMA

MARCY L. SUSSMAN, M.D.,* DAVID A. DREILING, M.D.**
and GEORGE JACOBSON, M.D.***

The history of otherwise unexplained upper abdominal complaints more frequently than in the past leads the clinician to the suspicion of pancreatic cancer. A dull persistent pain high in the abdomen, referred to the back or sometimes to the lower abdomen, is particularly significant and justifies further investigation. Jaundice, weight loss, anorexia, constipation, nausea and vomiting particularly when associated with this type of pain are very suggestive of pancreatic neoplasm. The finding, in addition, of an upper abdominal mass or enlarged gallbladder, perhaps with transient glycosuria or a diabetic type of glucose tolerance curve, make an exploratory operation practically mandatory.

It is important to note, therefore, that in about 50% of patients(1) examined roentgenologically, evidence suggesting pancreatic neoplasm was obtained. When these data was supplemented by a study of the external secretion of the pancreas obtained from the duodenum after the administration of secretin, the percentage of correct diagnoses is materially increased. Both of these types of investigation will be the subject of this review. It is the authors' experience that they are the most easily performed with accuracy and are most productive of reliable data. For completeness, reference must be made also to the study of the cytology of duodenal aspirates(2) which, in our hands, has been unsatisfactory. Our enzyme studies have been limited to amylase, largely because this enzyme is stable and determinations can be reproduced with simple technics with an accuracy of about 98%.

The pancreas does not differ in roentgen density from its surrounding tissues. It cannot therefore be visualized directly unless there is calcification within it. Visualization of the pancreatic artery is sometimes obtained by aortography but the practical value of the procedure has not been fully explored. The roentgen data relative to the pancreas are obtained primarily therefore by studying adjacent viscera which can be outlined radiologically. The head of the pancreas lies in the concavity of the duodenum. It is surrounded on three sides by the duodenal curve and the prepyloric area of the stomach. The head is covered anteriorly by the gastric antrum, the duodenum and the transverse colon. Posteriorly there are the vena cava and right renal vessels and, to the left, the aorta.

The neck of the pancreas, which connects the head to the body, runs forward, upwards and to the left. In front there is the pylorus and first part of the duodenum; in back, the portal vein.

The body extends to the left at the level of the first or second lumbar vertebra. Anteriorly the stomach is separated from it by the omental bursa while inferiorly there is the transverse mesocolon. The body has a prismatic form and is largest in front of the left kidney.

The tail extends across the left upper abdomen to end adjacent to the infero-medial surface of the spleen. It may present an abrupt blunt ending or may taper off in an elongated narrow segment.

These anatomic relations indicate clearly that in seeking a pancreatic mass, the most revealing roentgen examination is likely to be that of the gastro-intestinal tract. On the other hand, the occasional difficulty in differentiating a left renal neoplasm also will be appreciated. The gastro-intestinal tract may be outlined with air or, as is more usual, with barium.

The pancreatic dust of Wirsung opens into the ampulla of Vater in the majority of cases but occasionally empties independently into the duodenum. The common bile duct and the pancreatic duct join above a common sphincter in at least 60% of cases. In about one-third there are separate openings into the duodenum. Of more significance in the roentgen interpretation however is the variation in the position of the common bile duct since a dilated duct may be visualized by the pressure it exerts. Most often, the duct passes proximal to the knee of the duodenal bulb, less frequently distal to it and least often it crosses at about the level of the ampulla of Vater.

Read before Sixtieth Annual Meeting, Arizona Medical Association, Tucson, Arizona, May 2, 1951.
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The pancreatic anomalies are worth listing. According to Poppel they are:

1. A separation of the part of the head known as the uncinate process which then forms a lesser pancreas.

2. A growth of the pancreas around the duodenum which it may encircle and incidentally even may obstruct.

3. The variations in the termination of the pancreatic duct described above.

4. Accessory pancreas sometimes found in the wall of the stomach or jejunum and rarely in a Meckel's diverticulum.

5. Displacement of the main pancreatic duct by a congenital diverticulum of the duodenum near the ampulla of Vater.

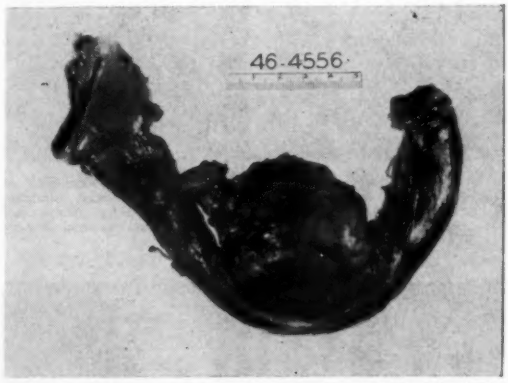

Fig. 1. Autopsy specimen of carcinoma of the head of the pancreas showing distention of the duodenal loop and encroachment on the medial wall of the duodenum.

The pressure defect produced by a pancreatic mass will depend on its location. Hick and Mortimer(4) reported that of 50 cases, 22 were in the head and 23 in the tail with 4 infiltrating the whole gland. A tumor of the head of the gland is likely to produce widening of the duodenal loop but with edges that are poorly defined (Fig. 1). While this finding is probably the most frequent, it is also the most difficult to evaluate because the apparent size of the loop must be judged according to the habitus of the patient and the position in which the examination is made. A stomach which is high and transverse, in a hypersthenic individual, will expose the normal duodenal loop more completely than usual and this appearance is exaggerated in the horizontal position. Indeed the correct interpretation may be so elusive that the roentgenologist ordinarily requires evidence of localized pressure on some portion of the duodenum or gastric antrum before suggesting the diagnosis. On the other hand, widening alone when judged critically by the experienced observer, will often justify laboratory investigation of the type to be described later. As Poppel points out, the extrinsic pressure, by its rounding or ironingout effect, changes the direction of the mesial ends of the duodenal mucosal folds and with severe pressure, the mucosal pattern may be greatly altered or even lost. The pressure defect may be localized above or below the ampullary region or may be general. There may be one smooth rounded-out contour or multiple scalloped-shaped defects.

The widened duodenal loop may not be a uniform change. The loop may be displaced to the right and anteriorly. (Fig. 2). The loop may be fixed mesially and normal expansion interfered with. (Fig. 3). The duodenum may be stenosed. (Fig. 4). There may be irregularity in outline with alteration or even destruction of the mucosal pattern. There may be alterations in the neuromuscular mechanism of the duodenum even in the absence of infiltration. This is manifested by abnormal motility of the duodenum with deep indentations and a churning to-and-fro movement.

Other evidence of a mass in the head of the pancreas includues upward or forward displacement of the stomach, downward and forward displacement of the transverse colon as well as pressure defect produced on the duodenum by a dilated common bile duct. A carcinoma in the region of the ampulla of Vater, whether it arises in the duodenum or in the pancreas, may require careful compression studies of this portion of the duodenum. The reversed 3 sign des-

Fig. 2. Autopsy diagnosis, carcinoma involving entire pancreas reaching both kidneys and with extensive metastases. Roentgen examination demonstrated widened duodenal loop with compression and elevation of the gastric antrum. History of abdominal pain, loss of weight, anorexia, nausea and vomiting for nine weeks.

Fig. 3 Operation revealed a firm, nodular mass about 3 cm. in diameter in head of pancreas obstructing the common duct. Roentgen examination revealed localized compression at the junction of the 2nd and 3rd portions of the duodenum with flattening of the mucosal folds. History of pruritis, jaundice, diarrhea and weight loss of 6 weeks.

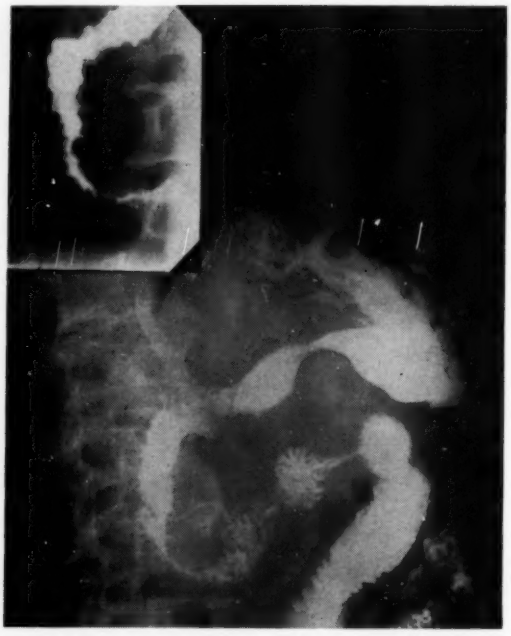

Fig. 5. Operation revealed a large hard mass in the head of the pancreas. Roentgen examination showed a widened duodenal loop, nodular compression of descending duodenum, compressed 4th portion and elevated, compressed contiguous stomach. History of dull epigastric pain, 1 month, jaundice 1 week.

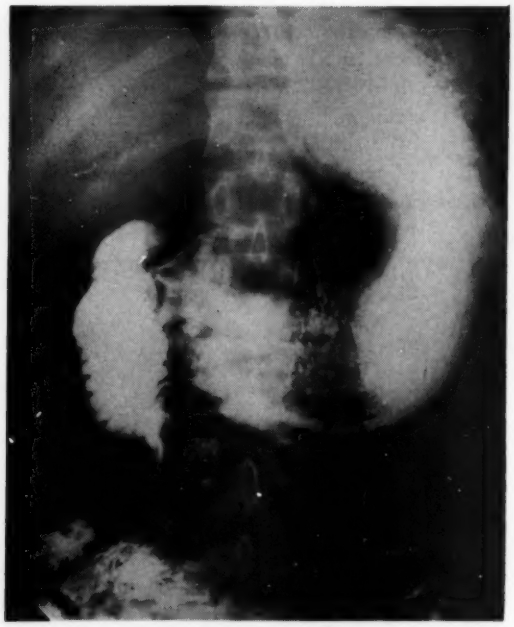

Fig. 4. Autopsy revealed a small firm indurated pancreas. A 1 cm. tumor mass invaded the common duct and pancreatic dust, apparently arising from the wall of the duodenum. Roentgen examination revealed partial obstruction in descending duodenum. History of cramping paraumbilical pain for 1 day, jaundice and fatigue for 6 weeks

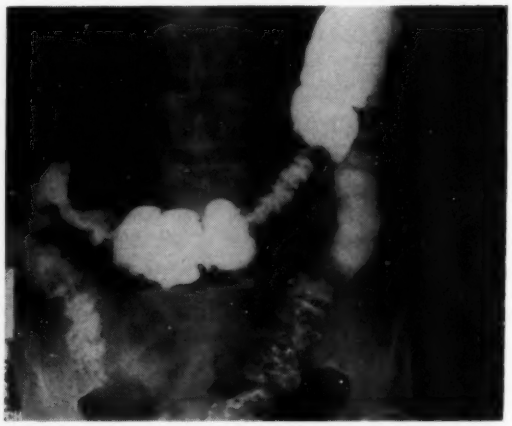

Fig. 6. Autopsy revealed carcinoma in head of pancreas with adherent and possibly invaded hepatic flexure. Barium enema showed persistent filling defect hepatic flexure. History of weakness one year.

cribed by Frostberg is a relatively infrequent finding, which in our experience is not entirely dependable. The finding of a palpable mass is of course of great assistance in the definitive diagnosis of pancreatic carcinoma.

Tumors in the neck of the pancreas may indent the gastric antrum displacing it upward and to the left. When in the body, the stomach is displaced forward with compression and

sometimes there is invasion of the posterior wall and lesser curvature. (Fig. 5). When the tail is involved, the stomach may be displaced to the right. When the tumor is large, the mid-transverse colon is displaced forward and downward. (Fig. 6). The ascending duodenum and the duodeno-jejunal flexure are indented and displaced forward, either upward or downward.

Borak(4) has stated that the duodenum is never displaced anteriorly by the enlarged pancreas. We agree however with Harper(5) who has seen anterior displacement without widening of the duodenal curve. Indeed, on rare occasions, carcinomas grow in atypical channels. It is well to keep in mind the radiological classification of pancreatic cysts(2) since carcinomas may be found in the same locations. Included are the gastro-colic type where enlargement takes place below the greater curve of the gastric antrum but above the transverse colon and the mesocolic type which indents the lower curve of the body of the stomach and displaces the distal transverse colon cephalad, the upper descending colon being displaced laterally.

To be considered in differential diagnosis are conditions giving rise to enlargement of the pancreatic lymph nodes, lymphoblastoma, metastatic carcinoma, infectious mononucleosis, tuberculosis, retroperitoneal sarcoma, and aneurysm. Elaboration of this phase is beyond the scope of the present report and indeed the differentiation may be made only with great difficulty in most cases unless there is guiding clinical data.

We will not enter into the subject of the roentgen examination itself since this is discussed in any good text book. Unfortunately, the wide gap between the description of what should be sought and the critical evaluation of the findings in a given case can only be closed by experience and not by more descriptive words.

The roentgenographic diagnosis of pancreatic tumors can be supplemented by biological diagnosis based upon direct study of the external pancreatic secretion with secretin.(6, 14). The biological approach is particularly useful in small tumors of the head and body of the pancreas which may be missed in the roentgen examination. It is also of value in precisely localizing the site of disease in patients with obstructive jaundice.

The secretin test of external pancreatic secretion is based upon the qualitative and quantitative study of the duodenal drainage following the intravenous administration of a purified secretin preparation. The hormone secretin stimulates the pancreas to produce a thin watery, high bicarbonate, low enzyme juice. The pancreatic response to secretin is defined by these three factors, viz., 1. volume, 2. bicarbonate concentration, 3. total enzyme secretion.(15). In diseases of the pancreas in which there is obstruction within the pancreatic ducts, it is the volume response which is primarily depressed; in diffuse parenchymal diseases, the qualitative factors, bicarbonate and enzyme concentration also are diminished. Thus the alteration of pancreatic secretion produced by neoplasms of the pancreas depends upon the site and severity of pancreatic duct obstruction which they cause. (15).

The procedure of the secretin test has been described previously.(15, 16, 17). The test is performed upon subjects in the fasting state. After positioning a double-lumened pastro-duodenal tube in the duodenal loop by fluoroscopy, 1.0 clinical unit/kg. body weight of secretin is injected intravenously. Simultaneous gastric and duodenal aspirates are obtained fractionally by continuous electric suction for 80 minutes. The normal values of the three factors which characterize the pancreatic response to secretin have been determined by a statistical study of the data of 81 patients without pancreatic disease.(16). These norms are as follows:

	Mean	*Mean Minus 2 sigma*
1. Volume	3.2 cc./kg.	2.0
2. Bicarbonate	108 meq./L.	90 meq./L.
3.Amylase secretion	14.2 u./kg.	6.0 u./kg.

The alterations in pancreatic secretion produced by tumors of the pancreas are illustrated by the data of 56 patients with pancreatic neoplasms in Table 1.

Location of Tumor	Number of Cases	Average Pancreatic Response Total Volume cc./kg.	Total Amylase u./kg.	HC03 Conc meq./L.
Diffuse	12	1.1	52	4.5
Head	26	1.4	81	5.0
Body	13	1.5	86	5.2
Tail	5	3.8	108	13.0
Average Normal	81	3.2	108	14.2
Minimum Normal		2.0	90	6.0

Table 1. Summary of Secretin Response Data of 56 Patients with Tumors of the Pancreas

It will be noted that in the diffuse pancreatic tumors both the qualitative and quantitative factors are markedly depressed. This is the result of combined pancreatic duct obstruction and replacement of functioning parenchyma by tumor. Lesions of the head exhibit mainly diminution of volume response. The average bivarbonate and amylase values are only slightly depressed due to the presence, in some of the cases, of associated pancreatic fibrosis and to the secondary suppression of function which occurs after long standing ductal obstruction. Tumors of the body of the pancreas, in general, show less marked changes than tumors of the head. Obviously smaller ducts are obstructed and less parenchyma is affected. All 5 patients studied with tumors of the tail of the pancreas showed normal secretion. Neoplasms in this location cannot obstruct a main pancreatic duct nor destroy sufficient functioning parenchyma to significantly reduce the pancreatic response to secretion. Thus the secretin test is of no value in the diagnosis of tumors of the tail of the pancreas.

Among these 56 patients, there were 2 cases with cancers of the pancreas (head and papilla of Vater) who exhibited normal volume responses. Both patients were not jaundiced. At operation, in neither case was there obstruction to either the common duct or the pancreatic duct. Both tumors had ulcerated and partially sloughed so that the ductal systems were not blocked. Two other patients, suspected of pancreatic malignancy, displayed low volume responses. At exploration, in neither case was any tumor found in the pancreas nor any lesion which could explain the "false positive findings." These may represent errors in technique.

Tumors contiguous to the pancreas do not produce an alteration of the pancreatic response to secretion unless there is actual invasion of the organ with resultant pancreatic duct obstruction or replacement of pancreatic tissue with malignant tumor. Table 2 lists the secretin response data of 16 patients with tumors of organs contiguous to the pancreas. Only cases 4 and 5, in which the tumors have secondarily invaded, the pancreas, show abnormal pancreatic secretion.

The biliary pigment response to secretin can be used in conjunction with the pancreatic response to localize precisely the site of pathology in patients with obstructive jaundice. The biliary pigment response has been previously reported.(15, 17, 18). It describes the biliary flow following intravenous secretin. Based upon the behavior of the duodenal biliary pigment concentration (icterus index) during the secretin test, three types of response can be classified as follows:

1. Type A. Bile disappears during the secretin test—normal gallbladder function.

2. Type B. Bile persists in high concentration during the secretin test—non-functioning gallbladder or post-cholecystectomy state.

3. Type D. Bile is obsent through the secretin test, no B bile after $MgSO_4$—complete biliary obstruction.

Tumor Site	Pancreatic Response Total Volume cc./kg.	HCO3 Conc. meq./L.	Total Amylase u./kg
1. Duodenum Ca.	7.5	90	30.0
2. Retroperitoneal Ca.	3.1	113	29.0
3. Ca. Common Ouct	2.1	93	13.0
4. Ca. Pylorus-Head Pancreas	1.2	101	5.6
5. Ca. Fundus-Tail Pancreas	2.2	120	3.8
6. Ca. Common Duct	2.5	125	7.0
7. Retroperitoneal Ca.	3.2	98	15.3
8. Ca. Left Kidney	3.1	98	31.0
9. Retroperitoneal Ca.	2.7	113	8.7
10. Ca. Gallbladder—Common Duct	2.3	91	16.3
11. Ca. Common Duct	3.0	111	24.3
12. Ca. Portal Fissure	2.9	109	7.4
13. Retroperitoneal Sarcoma	3.2	121	22.7
14. Retroperitoneal Sarcoma	2.1	90	21.2
15. Ca. Common Duct	2.1	131	25.1
16. Ca. Duodenum	2.3	94	7.6

Table 2. Secretin Response Data of 16 Patients with Tumors of Organs Contiguous to the Pancreas

These three responses have been correlated

There are four possible combinations of pancreatic and biliary pigment responses in the secretin test. If jaundice is absent and the pancreatic response is abnormal (normal biliary pigment response with abnormal pancreatic response), the lesion is likely to be in the pancreas involving the body or head. Jaundiced patients with abnormal pancreatic secretion (abnormal pancreatic response with abnormal biliary pigment response) probably have lesions involving the head of the pancreas or the papilla of Vater. Jaundiced patients with normal pancreatic secretion (abnormal biliary pigment response with normal pancreatic response) have lesions of the extrahepatic biliary tract, whether calculus or tumorous cannot be determined from the test data. Finally patients who present a normal biliary flow and normal pancreatic secretion (normal biliary pigment response with normal pancreatic response) should be suspected by inference of having parenchymal dis-

PANCREATIC RESPONSE						
Total Volume cc./kg.	HC03 Conc. meq./L.	Total Amylase u./kg.	Uancreatic Response	Biliary Pigment Curve	Biliary Pigment Response	Operative Findings
1. Normal Pancreatic Response—			Normal Biliary Pigment Response			
3.4	105	6.8	Normal	A	Normal	Hepatitis
2.6	103	13.0	Normal	A	Normal	Hepatitis
4.7	98	11.4	Normal	BP	Normal	Biliary Cirrhosis
3.4	90	14.6	Normal	BP	Normal	Biliary Cirrhosis
2. Normal Pancreatic Response—			Abnormal Biliary Pigment Response			
3.4	134	22.4	Normal	D	Abnormal	Stenosis Common Duct
2.5	106	6.0	Normal	B	Abnormal	Common Duct Stone
3.0	111	24.3	Normal	D	Abnormal	Ca. Common Duct
2.1	131	25.1	Normal	D	Abnormal	Ca. Common Duct
3. Abnormal Pancreatic Response—			Normal Biliary Pigment Response			
2.7	59	2.2	Abnormal	A	Normal	Chronic Pancreatitis
1.4	94	7.3	Abnormal	A	Normal	Ca. Pancreas (Body)
1.3	121	7.9	Abnormal	A	Normal	Ca. Pancreas (Body)
1.7	114	13.8	Abnormal	A	Normal	Ca. Pancreas (Body)
4. Abnormal Pancreatic Response—			Abnormal Biliary Pigment Response			
0.5	44	0.4	Abnormal	D	Abnormal	Ca. Pancreas (Head)
1.0	104	3.7	Abnormal	D	Abnormal	Ca. Papilla Vater
1.4	99	12.7	Abnormal	D	Abnormal	Ca. Pancreas (Head)
1.8	70	2.2	Abnormal	D	Abnormal	Ca. Pancreas (Head)

Table 3. Data of Cases Illustrating the Use of the Pancreatic and Biliary Piyment Responses of the Secretin Test in Precisely Localizing Pathology in Patients with Jaundice.

ease of the liver. These principles are illustrated in Table 3.

SUMMARY

When pancreatic carcinoma is suspected, considerable confirming data can be obtained by roentgen and biochemical methods. Radiographic examination of the gastro-intestinal tract is particularly useful in detecting the larger tumors of the head, body and tail as well as those which infiltrate contiguous organs. A qualitative and quantitative study of the duodenal drainage following the intravenous administration of a purified secretion preparation yields additional data. Where there is obstruction within the pancreatic ducts, it is the volume response which is primarily depressed. In diffuse parenchymal disease, the qualitative factors, bicarbonate and enzyme concentrations also are diminished. The results of these examinations with pancreatic carcinomas in various locations are detailed.

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PRESENT DAY CONCEPT OF THE PHYSIOLOGY OF GASTRIC SECRETION AND ITS RELATIONSHIP TO THE SURGERY OF PEPTIC ULCER

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The etiology of peptic ulcer, and its medical and surgical management have for generations provoked lively discussion as well as provided wholesome stimulation for experimental and clinical investigations. The criticism of the acid theory has slowly been subdued by the passage of time. The careful research of surgeons and physiologists, notably, Carlson(1), Munn(2), Williamson(2), Matthews(3), L. R. Dragstedt (4), and others have established the acid theory as the most plausible explanation of peptic ulcer formation. The clinical management which provides chiefly for the neutralization of the hydrochloric acid in the stomach has achieved results comparable to those obtained in diseases for which we claim specific antidotes.

The introduction of vagotomy in the treatment of peptic ulcer by L. R. Dragsteadt (5, 6, 7), in 1943 has not escaped the traditional stormy reception witnessed whenever gastric physiology is discussed. Why is it that Walters, (8), and others obtained unsatisfactory results with vagotomy, while Dragstedt(9), Grimson (10), Crile(11), and others present large series with enviably good results? Our own experience with vagotomies has convinced us that vagotomy with a posterior gastrojejunostomy is the best and safest operation for duodenal ulcer. It occurred to us that a better appreciation of the present divergent views on vagotomy could be sought in a review of the salient and acceptable facts dealing with the physiology of gastric secretion.

There is enough evidence to state that gastric secretion in peptic ulcer is more abundant, more continuous, and produces a higher level of hydrochloric acid over longer periods of time, than in normal man.(1). This concept may be plotted as follows:

It is logical to assume that this difference is brought about by the continuous activity of the cephalic phase of gastric secretion motivated through the vagus nerve. The gastric and intestinal phases of secretion and their associated hormonal effects cannot be incriminated for they depend upon the presence of particular food in the stomach on the one hand and the passage of chyme through the intestinal tract on the other. It seems plausible, therefore, that hyperactivity of the vagus nerve in terms of intensity and duration is the real physiological defect responsible for ulcer formation.

The severence of the vagi should, theoretically, effect a cure of peptic ulcer. The results of vagotomy obtained by various surgeons support, in practice, this theoretical deduction. The appreciation of the present day controversy is evident in the study of the total clinical effect of vagotomy on the patient.

The section of the vagus nerves in the lower limits of the esophagus accomplishes the following:

1. abolishes the cephalic phase of gastric secretion,(12)
2. removes the vagal motor influence on the gastric and intestinal musculature, and
3. decreases the secretory tonus of gastric mucosa.(13).

In terms of clinical observations, surgeons have reported the following symptoms as sequelae in vagotomized patients:

Secretory Changes:

1. Prompt disappearance of ulcer pain,
2. lowering of gastric juice acidity
3. decrease in total volume of secretion
4. healing of the ulcer

Motor Changes:

1. epigastric fullness
2. gastric retention
3. foul regurgitation
4. vomiting
5. diarrhea

The reported series on vagotomy differ greatly in their emphasis on these unpleasant after effects. The results in our own series of thirty-six vagotomized patients correspond with those reported by Dragstedt. Five patients, or 14% complained of post vagal syndromes of one type or another. Two of these five patients returned to normal within three months after survery and were satisfied with the operation. Three patients remained dissatisfied. One was found to have a persistent ulcer in the duodenum

*Read before the Sixtieth Annual Meeting of the Arizona Medical Association, at Tucson, Arizona, April 30, 1951

as well as an intact left vagus nerve. Subtotal gastric resection was performed. Following this the patient lost weight, from 160 to 125 pounds, and became dissatisfied because of inability to gain weight. The second patient, at re-operation, was found to have had a satisfactory vagotomy. A subtotal gastric resection was performed. This patient is still dissatisfied because of dumping syndrome which followed the gastric resection. The third patient had a vagotomy without gastrojejunostomy. After eight months of repeated gastric retention, we re-operated her by performing a simple gastrojejunostomy. This patient returned to normal.

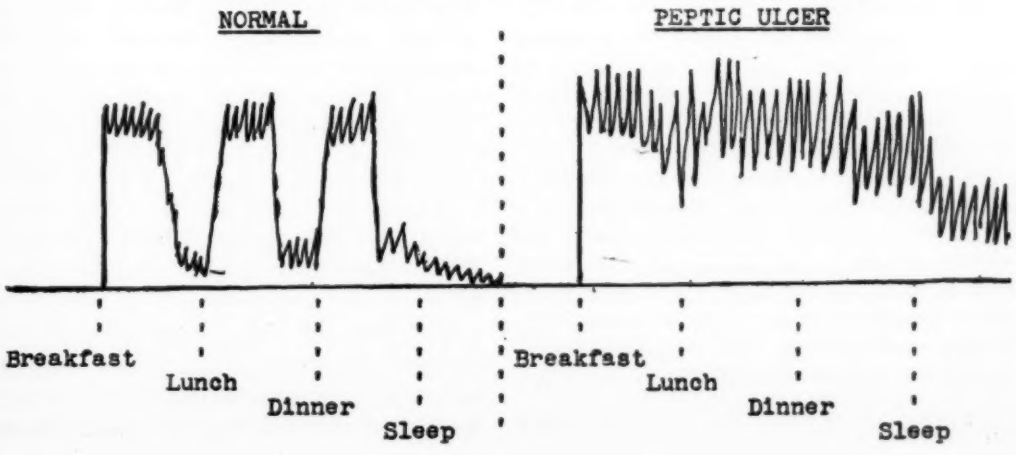
The analysis of the three unsatisfactory results shows that two of these, or 5.6% were errors on our part; one had an incomplete vagotomy, the other should have had a gastrojejunostomy at the time of vagotomy. Only one patient, or 2.8% had lasting, unsatisfactory results. There was no operative mortality, and no ulcer recurrance in six years.

It would be well to subject other surgical operations devised for the treatment of peptic ulcer to physiological tests. The operation of gastrojejunostomy is untenable as a treatment of active peptic ulcer. The physiological disorder responsible for ulcers is not corrected by this operation; in fact the susceptible jejunum placed in a position where it receives the full impact of acid gastric juice is rendered vulnerable to stomal ulcers. Gastrojejunostomy should be reserved for senile, poor-risk patients, whose peptic ulcers are burned out, who have little or no hydrochloric acid and whose major difficulty is duodenal stenosis.

The physiological accomplishment desired in the operation of subtotal gastric resection is the removal of the acid bearing portion of the stomach. Surgeons have learned by experience that at least the lower ¾ of the stomach must be removed in order to produce an achlorhydria sufficient to prevent the formation of stomal or jejunal ulcers. It is certain that the acid secreting cells do not stop in a neat line at the upper quarter of the stomach(14)(15). Subtotal gastric resection leaves a variable amount of parietal cells in the unresected portion of the stomach. This may, in part, be an explanation for the infrequent development of stomal ulcer following subtotal gastrectomy. The success of this operation depends on still another physiological requirement, the removal of the pylorus. This is important because the pylorus exerts a secretory influence upon the parietal cells left in the unresected portion of the stomach. The removal of the pylorus in cases of inflammatory reactions around a duodenal or pyloric ulcer, is not always possible. In this event, at least the pyloric mucosa should be removed in order to abolish the pyloric phase of gastric stimulation.

There is no doubt that sub-total gastrectomy is acceptable as a good operation. Its acceptance must be judged by the good results is gives, rather than by the excellence with which it corrects a known physiological disorder. The removal of the major portion of the stomach and the re-arrangement of the continuity of the flow of vital juices is not without sequelae and complications. Patients with subtotal gastric resection often do not gain weight, and some

THE AVERAGE DAILY SECRETION OF ACID GASTRIC JUICE



develop a chronic low grade nutritional type of anemia. In our series of one hundred consecutive cases, we had 2% mortality; six developed obstruction of the outgoing loop and four suffered with dumping syndrome. Four of the obstructed patients required re-operation; in the remaining two, the obstruction spontaneously released itself. The patients complaining of dumping syndrome suffered periodically for six months to two years. We have had no known ulcer recurrence following subtotal gastrectomy in ten years.

These physiological considerations lead us to the conclusion that vagotomy is an operation particularly suitable for the surgical correction of the existing ulcer disorder. Theoretically, vagotomy should heal any acid ulcer, be it in the stomach or duodenum. It should be unwise to perform a vagotomy on an actively bleeding gastric ulcer from an arteriosclerotic vessel when this ulcer, with its active bleeding, can be removed by subtotal gastrectomy. The benign or malignant nature of a gastric ulcer not definitely established preoperatively, can be diagnosed at operation by biopsy. If it is malignant, a total gastrectomy should be performed. If benign, the surgeon may terminate the operation by a vagotomy and gastrojejunostomy, or by subtotal gastrectomy. All writers agree that vagotomy is indicated in stomal ulcers which develop following subtotal gastric resection.

The operation of vagotomy requires a more skillful and deeper anesthesia than does subtotal gastrectomy. It should never be performed without gastrojejunostomy. Gastric decompression should be carried out for four to six days following vagotomy in order to overcome the immediate loss of motor tone. It may be necessary to aspirate the stomach several times after this initial decompression period.

The choice between vagotomy and subtotal gastrectomy as the standard surgical treatment of peptic ulcer must be made by the individual surgeon. His choice should be based upon the keen appreciation of the nature of peptic ulcer, post-operative complications, sequelae, mortality and the precise evaluation of the results obtained.

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CARDIAC DISORDERS OF COLLAGEN DISEASES*

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The term "Collagen Diseases" was formulated by Klemperer and his associates to denote a group of medical disorders characterized by generalized changes in the collagen or interstitial material of the body. This concept has been widened recently to include all derivatives of the primitive mesenchyme, the fibroblast, chondroblast, osteoblast, and the reticulum. The products of these cells, the collagen, hyalin, and osteoid, are related chemically and are susceptible to the same influences. The functions of these mesenchymal units are structural, supportive, and defensive. The reticulum and its motile cells, the monocyte, histiocyte, and granulocyte serves in defense by filtering the lymph channels and removing offending particulate materials. In addition, the reticulum produces the circulating antibodies probably through the lymphocyte and plasma cell. There is evidence that collagen, hyalin, and osteoid substances have a defensive action similar to the circulating immune bodies except that it is fixed to the tissue. Stimulation of this defense by antigens, toxins or injuries may produce chemical changes which are revealed in the altered staining reactions called "fibrinoid degeneration." If such reactions are severe, actual collagen necrosis may occur. The necrosis may produce an exudative reaction of the reticulum system with the

1. Presented at The Arizona Rheumatic Society Meeting, May, 1950, Phoenix, Ariz.

appearance of histiocytes, lymphocytes, and plasma cells. Frequently, proliferation of endothlial cells occurs for such severe reactions invariably involve the smaller blood vessels. The great number of factors which may influence the final lesions plus the many still unknown makes our understanding of the disease processes quite inadequate.

There is much current debate over the diseases to be classified as collagen diseases. Usually listed are rheumatic fever, disseminated lupus erythematosis, generalized scleraderma, dermatomyositis, periarteritis nodosa, and rheumatic arthritis. Some would include serum sickness and throbo-angiitis obliterans. We will discuss only the usually accepted group.

Symptomatically there are many similarities, but occasionally only time will differentiate between them. All have intermittanty swolen, painful musces and joints. Fever, weakness, malaise, anorexia, fatigue, weight loss, and anemia appear during the course of these diseases. Vague gastrointestinal, genito-urinary and neurological symptoms are common. Pathologically each disease has characteristic lesions, although frequently lesions in every way similar to those found in other of the collagen diseases. This is the source of confusion in present day literature.

It is not our purpose to discuss the cardiac disorders of rheumatic fever since they are well known. The importance of the heart disease in other collagen diseases is less well known.

RHEUMATOID ARTHRITIS

Rheumatic fever and rheumatoid arthritis have long been considered two separate diseases. Cases in which rheumatoid arthritic changes have been superimposed on typical rheumatic fever are not uncommon. That the changes typical of rheumatic endocarditis and myocarditis may occur in rheumatoid arthritis is recognized far less frequently. In those series of autopsy studies where the diagnostic criteria of rheumatoid arthritis are exacting, the percentage of cases with rheumatic heart diseases is high; yet the clinical diagnosis is missed in 30 to 50% of the cases. This is explained in part by the marked restriction of activity produced by the joint involvement which allows an embarrassed heart to function adequately under the load. The majority of these patients die of congestive heart failure, but at a later age than one would expect from the cardiac lesions. Murmurs are faint or non-existant. Cardiac enlargement is common in the later stages. X-ray reveals the changes in heart contour consistent with involvement of the various valves. Electrocardiograms reveal any or all of the changes found in rheumatic heart disease including auricular fibrillation and flutter, premature auricular and ventricular beats, prolonged P-R intervals, widened QRS, and all degrees from extreme right to extreme left axis deviation.

A 52 year old white housewife was seen at the office with a history of inflammatory rheumatism at the age of 10. Progressive rheumatoid arthritic changes in the hands appeared at the age of 30. The arthritis rapidly spread to involve all the joints which became markedly deformed. At 38 years of age signs of heart disease appeared with irregularity of rhythm. There was evidence of mitral stenosis and insufficiency. At age of 52 congestive failure was a constant problem. It was then evident that there was an aortic stenosis also present. She died in congestive failure at 53 of rheumatic heart disease with involvement of the aortic and mitral valves.

The pathology found is typical of rheumatic heart disease with thickening of the valve margins, shortened thick chordae tendinea, endocarditis, valvular stenosis, ventribular hypertrophy, etc. Aschoff bodies are rare, although perivascular collections of fibroblasts, lymphocytes and fibrous tissue are common.

It is evident that there is a close relationship between rheumatic fever and rheumatoid arthritis, and are probably manifestations of the same basic disease processes.

DISSEMINATED LUPUS ERYTHEMATOSIS

Clinical symptoms of heart disease are rare in disseminated lupus erythematosis except when a pericarditis is associated. Tachycardia is common and related to the fever. Systolic murmurs are frequent, but not from valvular disease. Congestive failure may occur rarely, but death is almost always due to other causes. The Chest x-ray may show a normal cardiac contour or mild diffuse enlargement. There are no specific electrocardiographic findings, but changes of nonspecific myocardial damage may be found.

Pathological findings are of a subendothelial, fibrinoid degeneration of the ground substance to produce a verrucous plaque on the endocardium. These are most common on the valves. Throughout the myocardium the collagen tissues

show swelling, rigidity and deep staining with eosin. There is an associated fibroblastic activity with the appearance of lymphocytes and fibroblasts in the homogenous staining material.

An 18 year old white male was seen complaining of multiple hemorrhagic areas in the mouth and over both lower legs and feet for 3 years. He had had painful swollen joints, subcutaneous nodules, and daily low grade temperature up to 102 degrees for 4 months. He had a constant normocytic anemia and leucopenia with counts ranging from 3,300 to 6,100 cells. The urine showed a constant albuminuria with waxy, hyalin, and granular casts, red and white cells. The kidney function was diminished. Later a soft, systolic heart murmur was found, and an erythematous lesion developed across the nose and upper cheeks. His course was steadily down hill despite transfusions and supportive therapy. He died seven months after the onset of the arthritis. At autopsy evidence was found of subsiding pericarditis, verrucous endocarditis on the mitral valve, and thickening of the endothelial membrane. The final diagnosis was disseminated lupus erythematosis.

DERMATOMYOSITIS

Clinical evidence of myocardial disease is more frequent than commonly realized. The patient has a persistent tachycardia frequently out of proportion to the fever, and may persist during remissions. It may be used as an index of activity of the disease. Dyspnea, edema, pallor, cyanosis, palpitation, and even arrhythmias may appear during the course of the disease. It is difficult, at times, to state just how much of these complaints are cardiac in origin, for the involvement of the respiratory muscles may seriously impair the respiratory system. Congestive failure, especially of the right side, is more common than in other of the collagen diseases. It is responsible for a fair percentage of the deaths from dermatomyositis. The chest x-ray may reveal a heart normal in size and contour or diffusely enlarged. Electrocardiographic abnormalites are non-specific, but indicative of myocardial damage. There may be prolongation of the P-R interval, altered QRS complexes and T waves.

Reports of pathological material are scarce, but suggestive that the same process present in the skeletal musculature may appear in the cardiac musculature. The muscle fibers are swollen and appear fragmented. The sarcolemma shows hyalinization. The cross striations are obscured. Lymphocytes and histiocytes are scattered through the interstitial tissues. With healing, fibrosis and replacement of muscle fibers occurs.

A 45 year old white housewife came in complaining of soreness in the left chest for six months. For 10 years she had had migratory joint pains and muscle soreness. Fever to 102F. degrees had been present eight months. She was emaciated, and a doughy, tender swelling of the cutaneous and muscular tissues of both forearms was present. The heart was enlarged and a Grade I apical systolic murmur was noted. The pulse rate varied between 110 and 125 per minute. A chest x-ray showed moderate cardiac enlargement predominantly of the left ventricle. An electrocardiogram showed changes suggestive of an old posterior myocardial infarct. Biopsy of the left forearm showed focal areas of inflammatory reaction characterized by lymphocytes, leucocytes, and eosinophils. Similar changes were found in the epidermis. Pathological diagnosis: Dermatomyositis. Final anatomical proof of myocardial involvement is not yet available, but the findings are quite compatible.

SCLERADERMA

This generalized disease with the striking skin manifestations may have a typical course of heart disease. Clinically the patient may show signs of cardiac disease before the skin lesions are apparent. The patient may note precordial soreness, dyspnea, orthopnea and cough. Edema is not uncommon. Palpitation is frequent. The heart is found to be enlarged diffusely, and the beat has a small amplitude. Evidence of congestive failure is frequent and often the cause of death. The electrocardiogram is abnormal showing evidence of non-specific myocardial damage with abnormal auricular and ventricular conduction.

Pathological findings are a grossly enlarged heart showing fibrotic scars of an unusual type. These are a focal overgrowth of connective tissue with fibroblastic proliferation. The collagenous fibers are enlarged and refractile. Blood vessels in the area are not affected and appear normal. The scars appear characteristic to the disease.

PERIARTERITIS NODOSA

Periarteritis nodosa has protean manifestations by the very nature of the tissues affected. The heart is frequently affected and presents symptoms in the majority of cases. Dyspnea, tachycardia, palpitation, orthopnea are common. Substernal pain entirely typical of an acute coronary occlusion may appear. Signs of congestive failure with cough or edema are usual. Death may be sudden from a massive infarction or rupture of an aneurysm on an affected vessel. The heart may or may not be enlarged in the chest x-ray. An electrocardiogram is abnormal when the heart is involved, and may show anything from non-specific myocardial damage to the typical findings of a coronary occlusion.

The pathological findings vary depending on the stage of the disease. In the acute phase the small and medium size arteries show necrosis with a leucoytic infiltration of neutrophils, eosinophils, lymphocytes in the media and adventitia. Later, fibroblastic proliferation with peri-arterial infiltration of lymphocytes and monocytes appears. Thrombi, recent and old, are found with some canalized. Atrophy of the tissue involved is present.

CASE REPORT

A 33 year old white male was seen in the office complaining of severe cramping abdominal pain unrelated to food or any other factor. Following a severe mastoiditis five years previously, he developed a migratory polyarthritis then diagnosed as rheumatic fever. Four months and again two weeks before he was seen he developed a right hemiplegia of a short duration. For four months he had noted painful purpuric lesions over the bony prominences which were slow in healing. On two occasions he had experienced excruciating substernal pain radiating down the left arm associated with dyspnea and drenching perspiration. An electrocardiogram did not show evidence of coronary occlusion. Minor changes were noted which were not diagnostic. Biopsy showed "periarterial inflammatory reaction with marked thickening of the medium sized blood vessels." The patient had a rapid downhill course with increasing renal failure. He died suddenly from an intracranial hemorrhage. The autopsy revealed periarterial inflammatory reactions with proliferations of the intima in many of the organs. The heart was enlarged and showed focal areas of muscular degeneration.

SUMMARY AND CONCLUSIONS:

Evidence has been presented that heart disease is a frequent finding in the collagen diseases. The character of the disturbance depends on the disease. Occasionally the heart symptoms are the only manifestation of the underlying disease. The collagen diseases should be considered in cases of heart disease of uncertain etiology.

PHOENIX *Clinical* CLUB

MASSACHUSETTS GENERAL HOSPITAL CASE NO. 36312

The Case History in this discussion is selected from the Case Records of the Massachusetts General Hospital, and reprinted from the New England Journal of Medicine. The discussant under Differential Diagnosis is a member of the staff of the Massachusetts General Hospital. The other discussants are members of the Phoenix Clinical Club.

A sixty-two-year-old man was admitted to the hospital because of intermittent vomiting.

Four months before entry the patient noted the onset of belching and crampy para-umbilical pain about four hours after a large meal. The pain was slightly more marked on the left than on the right. A short time later he vomited a large amount of yellowish material containing some partially digested food. During the next month and a half he had several similar but less severe attacks, and therefore he consulted his physician. A gastrointestinal series and a Graham test were said to be negative. Since that time at intervals of about eight to ten days he had had attacks usually lasting about three hours and occurring after large evening meals. These attacks were characterized by midabdominal pain, belching and generalized bloating followed by vomiting. The pain occasionally went through to the right side of the back, and symptoms were always relieved by vomiting. At times food taken two or three meals before the attack could be recognized in the vomitus. During the ten days just before admission, at-

tacks had been more frequent, and he had a sensation of gradual "filling up" over a two-day period, followed by abdominal pain and vomiting. The pain was never severe enough to cause him to double up, and there had been no hematemesis or melena although the stools decreased and were somewhat lighter. There had been no fever, chills or jaundice. Although he had lost 10 pounds in weight during the four-month period he had continued to feel well and worked every day. He had been taking tincture of belladonna for two and a half months before entry.

The past history and review of the systems were noncontributory.

Physical examination showed a well developed man who appeared chronically ill but was in no acute distress. The skin and mucous membranes were slightly dry, and the tongue was coated. There were a few small palpable axillary lymph nodes bilaterally. The heart sounds could not be well heard, and the heart seemed to be displaced or obscured by a large dilated stomach. There was slight abdominal distention with what seemed to be a large dilated stomach in the left upper quadrant. This area was tympanitic whereas the rest of the abdomen was relatively dull. There was a suggestion of a cylindrical mass at the left rectus border in the upper abdomen. There was very slight tenderness in the left lower quadrant. Bowel sounds were depressed, and only occasional tinkles were heard.

The temperature was 100.4°F., the pulse 78, and the respirations 20. The blood pressure was normal.

A urine specimen was normal. Examination of the blood revealed a hemoglobin of 13.8 gm., and a white-cell count of 6700. The blood sodium was 142.0 milliequiv., and the potassium 4.7 milliequiv. per liter, the protein 5.9 gm., and the nonprotein nitrogen 25 mg. per 100 cc., and the prothrombin time 20 seconds (Normal 17 seconds). The sedimentation rate was 0.4 mm. per minute. A gastrointestinal series showed a normal esophagus. The stomach, the duodenum and the jejunum up to a point about 2 feet from the ligament of Treitz were grossly dilated with fluid. In this region the lumen of the bowel was narrowed. The bowel distal to the area, which could only be seen by virtue of small amounts of barium, was of normal caliber. No tumor edge could be made out in the obstructed area, but the examination was considered not entirely satisfactory. Anteroposterior films made with the patient in the supine and in the erect positions showed a large amount of barium and fluid retention within the stomach, as well as visualization of the widened jejunal loop. Some barium was also observed in the right half of a nondistended colon. Several calcified lymph nodes were seen to the right of the lower lumbar spine. A roentgenogram of the chest was not done.

Clinically, the patient remained unchanged, and on the third hospital day an operation was performed.

DR. THOMAS W. WOODMAN

The case to be discussed today is a sixty-two year old man having intermittent vomiting noted four months before admission to the hospital. He had pain about the umbilious, a little more pronounced on the left side, and this pain was relieved by vomiting. He had not noted any blood in the vomitus nor had there been any tarry stools. There was marked gastric retention as shown by the fact that he vomitted food he had eaten a couple of days before vomiting and also by the G. I. series. He had not had any fever, chills or jaundice. The x-ray showed a normal esophagus. The stomach, the duodenum and the jejunum up to a point about two feet from the ligament of Treitz was grossly dilated with fluid. In this region the lumen of the bowel was narrowed. The bowel distal to the area, which could be seen only by virtue of small amounts of barium, was of normal caliber. No tumor edge could be made out in the obstructed area, but the examination was considered not entirely satisfactory.

This case seems to be a rather clear-cut intrinsic lesion in the small bowel.' The x-ray certainly does not indicate that there is pressure from without although this must be considered. As is commonly true in these clinical club cases, it just seems a little too simple and I'm more than suspicious that things are not exactly as they seem since Palmer Dysart selected the case.

This lesion could well be carcinoma arising from the mucosa which has produced mechanical obstruction. The patient had lost only ten pounds in weight but commonly the first symptoms noted of carcinoma of the small bowel are those due to mechanical obstruction and to intestinal bleeding. I certainly cannot rule out carcinoma of the small bowel but the absence of

bleeding is somewhat against this diagnosis for usually the carcinoma group, because of early mucosal involvement give rise to bleeding rather early in growth. The sarcoma group arising outside the lumen, on the other hand, may be present for a considerable period of time before the mucosa is invaded and ulceration produced. Either of these groups of tumors may occur at any time from infancy to advanced age but the carcinoma group occurs more commonly in the fourth or fifth decades of life while the sarcoma group occur more commonly in the fourth decade. Certainly there is not enough difference in the age of occurrence to make this very helpful in the case being discussed.

The pathology present in this patient could be of a chronic jejunitis. I operated on such a case last winter in which the jejjunum had the appearance more commonly seen in regional ileitis and the x-rays were quite similar to the ones described in the case being discussed today. The exact eliology of such a jejunitis is not known but is sometimes due to parasitic infection and the most common of these is Strongyloides stercoralis. In most of these parasitic infections, however, there is a long history of illness and of weight loss. Then too, they are more common in younger people.

It is difficult for me to discuss anything but lesions of the bowel itself for, from the description given, I do not believe the bowel obstruction is extrinsic in origin. If the lesion was extrinsic this would have been indicated by the x-ray findings and if the mass in some other organ extrinsic to the bowel was of sufficient size to obstruct the lumen of the jejunum at the level of obstruction described, it is my opinion that the mass would have been of sufficient size to be readily palpable for this section of the jejunum can be moved about over a wide distance and only a large mass could obstruct it extrinsically by pressure. An invasive lesion arising outside of the jejunum would have given more symptoms over a much longer period of time than that given in the history of this case.

The small intestine may harbor a variety of benign tumors although these are extremely rare. These lesions include leiomyomas, fibromas, submucous lipomas, lymphangiomas, hemangiomas, polyps and carcinoids. The prevailing symptoms are similar to those of the malignant lesions and the differentiation can only be made by the operating surgeon and the pathologist. In the differential diagnosis, however, we must include deformities and constrictions of the bowel due to adhesions, extrinsic tumors and inflammatory masses, inflammatory processes such as tuberculosis and non-tuberculous ulcers, as well as regional jejunitis and lesions of the mesentery deforming the intestine. It can be very difficult and frequently impossible to differentiate on x-ray between a construction of the bowel with proximal dilatation caused by adhesions, and a constricting malignant tumor producing the same picture. According to the history he had not had previous surgery which might have produced adhesions.

In this case the bowel distal to the constricted area as seen on x-ray could only be made out by virtue of small amounts of barium but it is described as being of normal character. On x-ray, carcinoma of the jejunum generally appears as an irregularly constricting lesion 3 to 6 or 8 cm. in length and lymphosarcomas may be similar. However, it has been emphasized that lymphosarcomas often cause dilatation of the lumen of the bowel and frequently develop to a large size of 10 to 15 cm. before causing severe clinical symptoms. The pebbled or corrugated surface pattern of the mucosa of the bowel as seen by a barium study is quite characteristic of lymphosarcoma and such a picture is not presented in the x-ray description. Many instances of neurogenic sarcoma, fibrosarcoma, and leimyosarcoma of large size have been reported with mild or no obstruction of the intestine, while large carcinomas which do not obstruct the intestine are rare.

The suggestion of a cylindrical mass at the left rectus border in the upper abdomen on examination of this patient, together with the x-ray and other laboratory findings, plus the patient's age, suggest to me that this man had a malignant lesion of the small bowel resulting in obstruction. My first diagnosis is carcinoma, and second, sarcoma of the jejunum.

DIFFERENTIAL DIAGNOSIS

Dr. S. Peter Sarris*: As the history is recorded in this abstract it appears quite uncomplicated and straightforward. Essentially, it is a history of a sixty-two-year-old man who for four months had symptoms consistent with recurrent high intestinal obstruction. This was further confirmed by the physical examination and the x-ray findings. Furthermore it is fortunate that

*Clinical associate in surgery, Massachusetts General Hospital.

there was no complicating disease in any of the other systems or any significant past history. In fact the history is so typical of obstructing jejunal neoplasm that one hesitates to make the diagnosis, especially at one of these meetings.

Let me go over the history to see if I can emphasize any pertinent evidence of a positive or negative valve. The vomitus was very characteristic and very helpful in the diagnosis. It contained undigested food and later food eaten two or three meals before; furthermore, from its color it contained bile, which would place the obstruction distal to the pylorus. The fact that the crampy pains were relieved so easily and promptly by vomiting and that this relief lasted some time would also place the point of the obstruction high in the jejunum. The pains with low intestinal obstruction lower ileum or large bowel—seldom improve or disappear after vomiting. They may improve silghtly, but this relief only lasts a short time. The belching that was mentioned prominently in the history is also helpful in the diagnosis of a high intestinal obstruction. There was a negative gastrointestinal series and a negative Graham test done earlier presumably in another hospital from the statement, "said to be negative." I do not know whether that included a barium-enema examination or just an upper gastrointestinal series and, what is more important, whether it included a motor meal or only a study of the stomach and esophagus. Small bowel lesions are notoriously missed if the roentgenologist is not instructed specifically to look for them. The pain going up into the back may be significant in indicating involvement of the mesentery of the bowel. The fact that the stools were smaller and lighter is completely obstructing the upper small bowel and preventing food and gastrointestinal juices, particularly bile, from going through.

On physical examination the general appearance was consistent with a slowly progressing obstruction, as was the distention. There was the suggestion of a mass on the left side; I do not know whether that means that there was no mass, just some spasm of the rectus muscle or an elusive mass. Often, before tumor of the small bowel becomes fixed, palpation pushes the tumor among other loops of small bowel, and thus it is made to disappear. The smal palpable axillary lumph nodes may be significant. They might be tied up with a lymphoma of the small bowel.

The laboratory data were not significant. There was no leukocytosis, and there was no mention of any stool examination for blood. There are certain questions that I should like to ask the radiologist. Was the mucosa ulcerated or not? Was there evidence of extrinsic or intrinsic narrowing? Was the barium in the right half of the colon found at the same examination as the gastrointestinal series? If it was on the same day, it would suggest a fistula between the small bowel and colon.

Dr. Stanley M. Wyman: As Dr. Sarris has suggested, these films were not all done on the same day. Some films were taken at the time of fluoroscopic examination, and others on the following day. I might say that this is the wrong way to examine this kind of patient. An upper gastrointestinal examination should never be done in any case of small-bowel obstruction. The patient should be intubated and then after he has been cleaned out, a good examination can be made by introducing barium into the tube in the small bowel. This film shows fluid levels in the duodenal loop with barium trickling past the ligament of Treitz into the much-distended jejunum. The obstruction lies somewhere in this neighborhood; it cannot be adequately seen on any film. A very small amount of barium is seen to have trickled past this obstruction. These two spot films of the distal loop of jejunum, as far as I can see, fail to demonstrate the mucosa in the narrowed bowel, and I can only assume that there is a narrowed segment there. I cannot make any statement about how the barium got into the right colon in these films taken twenty-four hours later. There is nothing to suggest fistula.

Dr. Sarris: How far into the colon can you see barium?

Dr. Wyman: Up to the left transverse and possibly the descending colon.

Dr. Sarris: Could there be a fistula there?

Dr. Wyman: I do not believe so. The barium has mostly concentrated in the cecum and is strung out from there into the region of the splenic fixure. The point of obstruction may be in the center of this loop.

Dr. Sarris: Can you make a statement whether the narrowed area is a point narrowing, or does it extend a few centimeters?

Dr. Wyman: I cannot even see the narrowing. I can simply assume it is there. That is why I say this is an inadequate examination.

Dr. Sarris: At least it is helpful in making a diagnosis of a high jejunal obstruction.

What lesions in the upper jejunum produce an obstruction like this? Inflammatory reactions, either nonspecific or granulomatous, such as regional enteritis, can occur in the jejunum and can produce isolated lesions, but more commonly they produce multiple lesions. Of course, this could represent the upper lesion of a group of lesions in the small bowel. However, I cannot make that diagnosis. The recurrent bouts of obstruction due to regional enteritis last for days—that is, the inflammation does not subside very suddenly following vomiting. There may be an episode of abdominal pain and vomiting that lasts for a few days and then improvement as the inflammation subsides. Calcified lymph nodes were mentioned, which can indicate tuberculosis, but I think this type of lesion produced by tuberculosis would be extremely rare and there was no evidence of tuberculosis elsewhere. Certainly, calcified lymph nodes like those in the abdomen are very common so that we need not pay too much attention to them.

Adhesions, which can occur without previous operation, are a common cause of intestinal obstruction. This could perfectly well be an attack of jejunal obstruction produced by an adhesion. However, from the history I think I can exclude adhesions. Frequently, in intestinal obstruction from adhesions there is a preceding episode or two of intestinal obstruction but not an acute attack every few days.

Gallstone ileus has become increasingly common. Two things against that, I think, were the negative Graham test and, more important, the fact that gallstone ileus is usually in the lower third of the ileum—not so high in the jejunum. I cannot see any gas in the biliary tree in the x-ray films, and none was reported. Then, too, the four-month history was a little long for gallstone ileus.

Could this stenotic area have been the result of a recurrent volvulus or a recurrent inteussusception? Volculus often recurs. The frequency of attacks and the fact that the obstruction was in the jejunum—the great majority of cases of volvulus are in the ileum and not high in the jejunum—were points against volvulus. In any large series of cases of small-bowel obstructon, there are a few cases in which one finds that there is a stenosis of the small bowel that is not explained pathologically. The stenosis could have resulted from localized mesenteric thrombosis in which the infarction was not sufficient to produce gangrene and perforation but in which there was sufficient ischemia to be followed later by stenosis. The stenotic areas may have been due to an old inflammation, but I cannot make that diagnosis without any preceding episode. I am not going to try to make a diagnosis of stenosis of the small bowel that a pathologist cannot explain.

The most likely condition is a tumor of the small bowel. The commonest tumor obstructing the small bowel is metastatic carcinoma. Even though one excludes cases of metastatic carcinoma in which the primary lesion is obvious, obstruction of the small bowel by metastatic carcinoma is more common than a primary tumor of the small bowel. However, in the absence of any primary lesion I certainly cannot make the diagnosis. At one of the previous conferences when I discussed a small-bowel case, the intestinal obstruction proved to be due to a metastatic carcinoma from the ball bladder. Here there was a negative Graham test. The stomach is a common site. I dare say that in a stomach with so much fluid and so much distention the radiologist might miss a carcinoma. Is that true?

Dr. Wyman: Positively.

Dr. Sarris: Then there might have been a carcinoma of the stomach with a metastatic lesion producing the obstruction in the jejunum. Any other part of the gastrointestinal tract could have been the primary site or even some organ outside the abdomen. In the absence of any hint of a primary lesion somewhere I am going to stick to a primary tumor of the small bowel. What types do we have? The so-called carcinoids constitute roughly a fifth of all the tumors of the small bowel and, as contrasted to the carcinoids of the appendix, often metastasize. However carcinoids are almost always in the ileum. There are very few described in the jejunum. Then there are the sarcomas, including the neurogenic sarcomas, leiomyosarcomas and the lymphosarcomas. I wonder whether the lymph nodes in the axillary area were meant to be significant. There are two points against a sarcoma. Sarcomas increase in incidence as one goes down the gastrointestinal tract. They are more common in the ileum than they are in the jejunum, as against carcinoma, which is more common in the jejunum than in the ileum; sar-

comas produce complete obstruction less frequently than carcinomas do. These differences are very small but have to be utilized if I am going to narrow down the diagnosis.

Carcinoma of the small bowel presents itself as a rule in three clinical types: The anemic, the obstructive and the perforative. The patient with the anemic type may have been treated for some time for idiopathic anemia; the obstructive type can produce a clinical picture like this; and the last type can perforate, producing generalized peritonitis, a large abscess or a fistula into another part of the gastrointestinal tract. Of course, many cases dovetail and demonstrate all three features. The case under discussion seemed to fall, if it was such a case, into the obstructive type, with only a slight anemia. Pathologically, the above classification corresponds to three types of lesions, the stenosing type, the polypoid type, with a fair amount of bleeding and a tendency to intussuscept, and the ulcerative type, with massive gastrointestinal bleeding and frequent perforation.

I think I shall make a diagnosis of high jejunal obstruction, which I will guess that this was a primary carcinoma of the jejunum. My second choice would be a sarcoma, and my third a metastatic lesion. Because of the amount of barium in the colon the possibility of a fistula should also be kept in mind.

Dr. Perry J. Culver: The x-ray films that were taken outside were done in the office of the patient's physician, who looked for an ulcer. That is what the diagnosis was. Those x-ray films were carried out just through the duodenum. The duodenum was not dilated at that time, two months before admission.

Dr. Sarris: I think that is very important, for early in high small-bowel obstruction, the dilatation of the proximal jejunum is often only transient. If the patient had recently been cleaned out, the upper gastrointestinal tract might perfectly well appear normal in the x-ray film.

Dr. Gordon A. Donaldson: My introduction to this patient was via these x-ray films. With the presence of a mass in the upper abdomen. It was obvious that something would have to be done surgically. However, we did take a few minutes to try to make a preoperative diagnosis. We were disappointed that there were no scars present on the abdomen because we thought this should have been the source of the obstruction—namely, a postoperative adhesion, which is by far the most common cause of obstruction of the small bowel. The calcified lymph node caught our eye, and we thought there might be an adhesion to it, causing the obstruction. This seemed likely in view of the X-ray Department's definite report that there was no shelf-formation or narrow area in the bowel. Of course, we considered carcinoma, rare as it is, although we were reluctant to make that diagnosis. The Mayo Clinic* has reported a group of 44 cases of primary carcinoma of the jejunum over a forty year-period.

CLINICAL DIAGNOSIS

Jejunal obstruction caused by adhesive band;? primary carcinoma.

DR. SARRIS'S DIAGNOSIS

Carcinoma of jejunum, with obstruction? Sarcoma? Metastatic tumor.

ANATOMICAL DIAGNOSIS

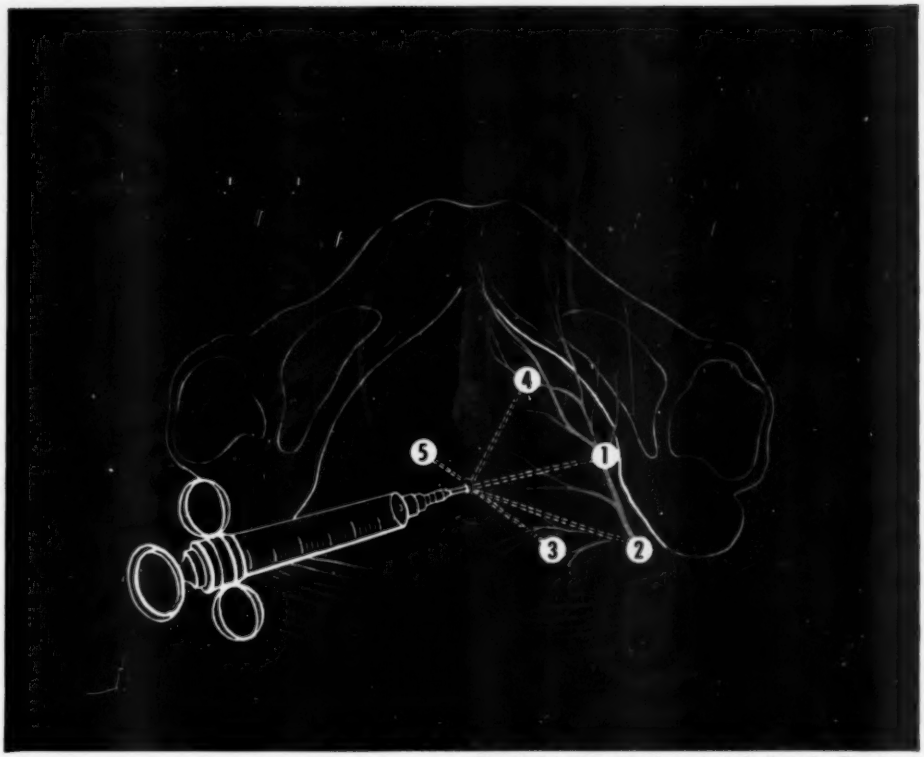
Adenocarcinoma of jejunum, with metastases to regional lymph nodes.

PATHOLOGICAL DISCUSSION

Dr. Donaldson: At operation the upper jejunum was greatly distended behind a large nodule in the mesentery of the bowel about 18 inches beyond the ligament of Treitz. The irregular mass was nearly as large as a golf ball. The jejunal mesentery was greatly foreshortened by it, and in the jejunal wall itself was an annular tumor.

Dr. Benjamin Castleman: The tumor was a completely annular adeno-carcinoma, which had extended through the wall of the bowel to form a mesenteric mass. In addition several of the regional lymph nodes were involved. It was a highly malignant adenocarcinoma.

*Pridgen, J. E., Mayo, C. W., and Dockerty, M. B. Carcinoma of jejunum and ileum exclusive of carcinoid tumors. Surg., Gynec. & Obst. 90:513-524, 1950.



Sites for injection of local anesthesia in obstetrics. Sites 1 to 4 should be similarly injected on the contralateral side. Site 5 is for episiotomy. Adapted from Johnson, O. J.: Nerve Block in Painless Childbirth, J.A.M.A. *145*:401 (Feb. 10) 1951.

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Using a local anesthetic with hyaluronidase, Heins[1] reports: "Complete perineal anesthesia is practically instantaneous. . . . The technique of pudendal block is greatly simplified. The operator does not have to inject the nerve per se, but infiltration in the vicinity of the nerve will accomplish an effective block."

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ALIDASE®—highly purified, well tolerated brand of hyaluronidase—definitely shortens the period between completion of the block and establishment of operating analgesia. Swelling, induration and discomfort are almost negligible with Alidase.

[1]Heins, H. C.: Pudendal Block with Hyaluronidase, J. South Carolina M. A. *46*:309 (Oct.) 1950.
[2]Baum, F. E.: The Use of Hyaluronidase in Pudendal Block, Am. J. Obst. & Gynec. *60*:1356 (Dec.) 1950.

RESEARCH IN THE SERVICE OF MEDICINE **SEARLE**

THE *Secretary's* MESSAGE

1952 Campaign American Medical Education Foundation

"THOUGH MUCH WAS DONE IN '51—THERE'S MORE TO DO IN '52"—. WITH THESE WORDS, DR. ELMER L. HENDERSON, LOUISVILLE, KENTUCKY, PRESIDENT OF THE AMERICAN MEDICAL EDUCATION FOUNDATION SOUNDED THE CALL TO ACTION FOR THE FOUNDATION'S 1952 DRIVE FOR FUNDS.

SPEAKING TO PHYSICIAN LEADERS IN MEDICAL PHILANTHROPHY FROM 48 STATES, GATHERED AT CHICAGO SHERATON HOTEL FOR A FEBRUARY 17TH "KICK-OFF" CONFERENCE, DR. HENDERSON STATED THAT THE YEAR 1952 WILL BE ONE FILLED WITH MANY DECISIONS, NONE OF WHICH WILL BE MORE IMPORTANT THAN THAT OF GIVING ADDED FINANCIAL SUPPORT TO OUR MEDICAL SCHOOLS.

THE PROGRESS OF PHILANTHROPIC GIVING THROUGH THE YEARS WAS OUTLINED FOR THE REPRESENTATIVES BY JAMES E. ALMOND, DIRECTOR OF THE AMERICAN CITY BUREAU, CHICAGO, ONE OF THE LARGEST FUND RAISING AGENCIES IN THE UNITED STATES. MR. ALMOND DREW UPON HIS VAST EXPERIENCE IN RAISING MONEY FOR CULTURAL AND EDUCATIONAL INSTITUTIONS AS HE TOLD OF THE PROBLEMS AND TECHNIQUES INHERENT IN THE VOLUNTARY SUBSCRIPTION OF FUNDS.

THE ONE DAY CONFERENCE OF STATE LEADERS WAS HELD FOR THE PURPOSE OF STIMULATING ACTION BY THE INDIVIDUAL STATES FOR THE CURRENT DRIVE WHICH WILL BE CONDUCTED BETWEEN APRIL 1 AND JUNE 30 OF THIS YEAR. THE VARIOUS SPEAKERS POINTED OUT TECHNIQUES IN PHILANTHROPIC FUND RAISING WHICH PROVED SUCCESSFUL DURING 1951 AND EXPLAINED NEWER DEVELOPMENTS WHICH CAN BE UTILIZED THIS YEAR.

A MAJOR CHANGE IN FOUNDATION POLICY FOR 1952 WAS OUTLINED FOR THE GROUP. THIS CHANGE AS VOTED BY THE DIRECTORS AT THEIR MEETING LAST DECEMBER CONCERNS THE METHOD OF DISTRIBUTION FOR THE AMEF MONEYS.

IN 1952 GIFTS WHICH HAVE BEEN DESIGNATED FOR A SPECIFIC MEDICAL SCHOOL WILL BE ADDED TO THAT SCHOOL'S BASIC GRANT FROM UNEARMARKED FUNDS. IN 1951 ALL EARMARKED GIFTS WENT TO THE SCHOOLS FOR WHICH THEY WERE DESIGNATED BUT WERE INCLUDED WITH UNEARMARKED FUNDS IN COMPUTING THE BASIC GRANTS. UNDER THE NEW POLICY IF MEDICAL SCHOOL A'S SHARE OF THE UNEARMARKED FUNDS IS $20,000 AND EARMARKED FUNDS TOTALING $5,000 HAVE BEEN RECEIVED FOR MEDICAL SCHOOL A, THE SCHOOL WILL RECEIVE A TOTAL GRANT OF $25,000.

IN EXPLAINING THE APRIL TO JUNE DATES FOR THE DRIVE, DR. DONALD G. ANDERSON, SECRETARY, TREASURER OF THE FOUNDATION POINTED OUT THAT THE MAJORITY OF STATE MEDICAL SOCIETIES ARE HOLDING THEIR ANNUAL MEETING PRIOR TO JUNE 30, 1952, THEREBY ENABLING THESE SOCIETIES TO IMPLEMENT, INTENSIFY OR CLIMAX THEIR EFFORTS AT THEIR ANNUAL MEETING. THE FOUNDATION DIRECTORS ALSO FELT THAT THE RESULTS OF A CONCENTRATED CAMPAIGN, SUCH AS THOSE CONDUCTED BY COMMUNITY CHEST, RED FEATHER, ETC., COULD BRING MAXIMUM RESULTS BY MID-YEAR, THUS LEAVING THE REST OF 1952 FOR WORK IN AREAS WHERE CONTRIBUTIONS LAGGED.

HARRY E. THOMPSON, M.D. OF TUCSON REPRESENTED THIS ASSOCIATION AT THE CHICAGO MEETING.

Editorial

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CONTRIBUTORS

The Editor sincerely solicits contributions of scientific articles for publication in ARIZONA MEDICINE. All such contributions are greatly appreciated. All will be given equal consideration.

Certain general rules must be followed, however, and the Editor therefore respectfully submits the following suggestions to authors and contributors:

1. Follow the general rules of good English, especially with regard to construction, diction, spelling, and punctuation.

2. Be guided by the general rules of medical writing as followed by the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION. (See MEDICAL WRITING by Morris Fishbein.)

3. Be brief, even while being thorough and complete. Avoid unnecessary words. Try to limit the article to 1500 words.

4. Read and re-read the manuscript several times to correct it, especially for spelling and punctuation.

5. Submit manuscript typewritten and double-spaced.

6. Articles for publication should have been read before a controversial body, e.g., a hospital staff meeting, or a county medical society meeting.

The Editor is always ready, willing, and happy to help in any way possible.

NEWEST DRUG FOR TUBERCULOSIS

A footnote should be added to the two recent editorial summaries of the treatment of tuberculosis.

A new drug which has great promise against tuberculosis has been widely and prematurely proclaimed. The fundamental drug is *isonicotinic acid hydrazide*. It was being carefully studied for its effects on cultures, animals, and humans when two New York newspapers broke the story. This possibly happened by the bribery of a laboratory worker, but it is hard to see how the news could have been kept. People have become too alert and expectant to wait for conservative science.

News conferences were immediately called by the National Tuberculosis Association, in conjunction with the research director of Hoffmann-La Roche and the E. R. Squibb and Sons companies, and the physicians who had been in charge of the investigation.

It was decided to give out the information available in mid-February, plus warnings which would emphasize the limited data and the possible place of the drug as a part of therapy.

The immediate result was a rash of news stories, and some very good summaries by columnists. Time Magazine hit the jackpot in a few days, as did Life Magazine. The Saturday Evening Post, the American Review of Tuberculosis, and the Quarterly Bulletin of the Sea View Hospital were scheduled for articles in April publication, but the last-named journal has been allowed to slip out ahead.

Isonicotinic acid hydrazide is known by two trade names for identical preparations, discovered separately. They are 'Rimifon' by Hoffmann-La Roche, and 'Nydrazid' by E. R. Squibb and Sons. Dr. Tucker of the Veterans Administration has suggested that the initials 'INH' be used to label for the drug. It might be mentioned that the recognition of the similarity of the drugs was followed by a quick and ethical cooperation of the highest order by Dr. Elmer Sevringhaus of Hoffman-La Roche, and Dr. Walsh McDermott and Dr. Geoffrey Rake of Squibb.

The American Trudeau Society has taken the lead in analyzing and warning. An executive council meeting was held at once, with the presence of all the people mentioned, plus Dr. Edward Robitzek of Sea View Hospital, Drs. McDermott and Muschenheim of Cornell-New York Hospital, and Mr. William Steenken Jr. of the Trudeau Laboratory, Saranac Lake.

We have collected information from numerous

sources, as of March 20th, and it can be summarized as follows,–

1. Isonicotinic acid hydrazide (INH) is remarkably effective against the tubercle bacillus in culture.

2. Bacterial resistance has not yet been encountered, tho subculturing has exceeded the number of cultures needed to produce resistance to streptomycin by five times.

3. INH is remarkably protective and curative for tuberculous infection in animals, even when inoculated intra-cerebrally.

4. The drug is suppressive, or bacteriostatic, *not* bacteriocidal, as stated in some news releases.

5. It is almost non-toxic, in therapeutic doses, in the animal and human studies so far. A third drug, 'Marsalid' of Hoffmann-La Roche, is moderately toxic).

6. INH is given orally, in pill form. It is said to be simple to manufacture, should cost about 50 to 70 cents a day when available, and could cost much less in a few more months. The companies will be able to produce enough for 100,000 cases in a few months, and easily triple that amount as needed.

7. The drug is non-patentable, but the basic material is indigenous to the United States. The base is said to be a component of jet fuel.

8. The ideal dose is not yet certain, but it may lie between 2 and 8 milligrams per kilo of body weight per day, or 150 to 400 mg. per day per patient.

9. INH is a cousin of nicotinic acid, and has some of the vitamin's effects. It is said to benefit patients with a nutritional deficiency, and to improve the appetite and general feeling.

10. The distribution of INH in the body fluids is generalized, and it passes thru into the spinal fluid in high concentration. A good portion of the drug is excreted in the urine.

11. Symptoms and fever have been reduced in some, but not all, of the patients who have been treated. It has been about as effective as SM and PAS in humans. (The patients shown dancing in the hall would not have been in bed anyway, and many of them actually had large cavities).

12. X-ray and sputum studies are too incomplete to be of much value. The cases chosen were usually far advanced or non-pulmonary. The longest series was started only in September 1951.

13. The Veterans Administration has started a controlled clinical experiment in a couple of dozen hospitals on February 15th, 1952. Rimifon is used in one of four research protocols (another of which is aldinamide). The dose is to be 150 mg. per day for 120 days.

14. The American Medical Association was notified of progress from the first. The Food and Drug Administration must pass on the evidence before the drug can be released for non-experimental use. This could occur by May or June if no unforseen hazard appears.

The obvious warnings should include those against overoptimism, the possibility of resistance (which can occur from any suppressive drug), and toxicity for certain individuals, which occurs with every drug.

Available therapy should not be deferred when the need is obvious. Surgery for destroyed lung tissue should not be put off. Case-finding should be pursued with even greater diligence.

The best educated guess is that INH, or another of its cousins, will find a prominent place in treatment of tuberculosis. It could be a strong factor in prophylaxis. It could change the emphasis on each of the methods used in anti-tuberculosis work. It would be reckless to predict anything beyond that with the evidence at hand.

TOPICS OF *Current Medical* INTEREST

RX, DX, AND DOCTORS

By GUILLERMO OSLER, M. D.

The entity of 'MILROY'S DISEASE' does not mean 'a compulsion to edit a better medical journal', and it was not named after our boss Dr. Frank Milroy. . . . It is otherwise known as HYPOGAMMAGLOBULINEMIA, a very rare condition in which the patient has a low total protein and an almost complete absence of gamma globulin. Edema is the only symptom. . . . One

patient has been followed for more than 20 years, and no therapy has yet changed the pattern (demonstrated by electrophoresis).

CYCLOCUMAROL is a new modification of Dicumarol. It has been given a fairly large quick test (Brambel, and others), and seems to have advantages. . . . It is more potent, begins its action a bit sooner, lasts longer, has scanty gastrointestinal toxicity, may be effective more often than Dicumarol, and it rarely produces serious bleeding. . . . Abbott calls its drug 'Cumopyran'.

Drs. Harris and Shure have reported their 'EVALUATION OF A NEW METHOD OF DUST CONTROL' in California Medicine. . . . Dust in Arizona is of a different quality, in general, from the predominantly protein substances which make up house-dust elsewhere, but the idea can be mentioned. . . . They have dustproofed the homes of 6 patients, using a spray of an emulsion of white mineral oil in water. The emulsifying agent was Triton NE. . . . Dust sampling showed excellent results, as did the clinical picture, in five. One experiment was ruined when a site adjacent to the house was torn up for building.

When the drug houses run out of PLUGS FOR A PRODUCT they cast far afield, even unto foreign shores, for small tencase reports. Here is one about Vitamin B12, for treatment of herpes zoster, from France. Here is one about B12, for migraine, from Norway. . . . We have seen, incidentally, five methods of THERAPY FOR MIGRAINE reported in the past two months, including vitamins B12 and A, gonadal hormones, psychotherapy, and a new ergotamine drug.

The 'SOLITARY PULMONARY NODULE' is important. If you don't think so you should see the numbers which turn up in mass x-ray surveys, sit in on a public health or staff surgical conference, or try to decide the status of a single case. . . . Most of the cases are symptomatic. Most of the lesions are small, and most could be half a dozen entities. Actually 25 to 55 per cent are malignant. . . . If the nodule cannot be proved nonmalignant, it should be treated as malignant, by resection. . . . History, sputum and gastric studies, skin-tests, Bucky films for calcification, sectional films, bronchoscopy, broncho-graphy, pneumothorax, angiography, general physical examinations are all helpful. . . . All time-consuming and too-expensive studies may be excluded if a few basic steps are not helpful. Exploratory thoracotomy is the next step.

FLUORIDATION of water supplies has been given the accolate of safety by the A.M.A. Council of Pharmacy and Chemistry, and the Council of Foods and Nutrition. . . . The history and principles of fluoridation are as described in an editorial in ARIZONA MEDICINE many months ago, and the usage has increased as predicted.

A recent article by Barfield, Harrod, and Goldblatt in the AM. J. of OB. and GYN. brings up two interesting items. . . . Methyl testosterone is the best of three ANDROGENS when given by the currently fashionable transmucosal, or sublingual, method. . . . Sixty-three patients had various 'GYNECIC' disorders. Do you know 'gynecic'? It is an interesting contraction of the clumsy, elongated word 'gynecologic', and maybe a way to shorten quite a few other medical terms. We can shorten 'pathologic' to 'pathic', but could we learn to use 'uric', 'physic', or 'bi-ic'?

The SUBLINGUAL ROUTE has also been used, with apparent success by Joseph Litwins, for the administrations of HEPARIN. . . . The cost and discomfort and travail of other means of giving heparin are well known. The new usage produces absorption of heparin from a wafer in 10 minutes, production of therapeutic levels in half an hour, and usual maintenance for four hours. . . . The method bears study.

Three times in the past three years the National Tuberculosis Association has borrowed an article from ARIZONA MEDICINE to abstract and send out to non-specialist physicians in the U.S. . . . An article from the July 1951 issue, "Delays in the Diagnosis of Tuberculosis from Incautious Use of Antibiotics" by W. H. Oatway Jr. (an associate editor of A.M.), will be put out to the 70,000 addresses in May.

ANTIBIOTICS.—The mortality in APPENDICEAL PERITONITIS has been reduced from 30 per cent to zero in patients over 12 years of age in a series at the Los Angeles County Hospital. The routine consists of massive doses of antibiotics before operation, with terramycin being slightly the best. It is given I.V., as is aureomycin, and penicillin and streptomycin are given I.M. . . . After surgery, selection of the antibiotic should depend on sensitivity test on the organisms which have been obtained.

Dr. R. O. Egeberg reports encouraging results in several cases of DISSEMINATED COCCIDIOIDOMYCOSIS after use of prodigiosin.

BACITRACIN has been found to be without local irritative effect in 300 cases with eye infections.

TRICHOMONAS infection in the male is recognized with increasing frequency. It has been stubbornly resistant to therapy. A recent small series of 11 cases has been treated with oral aureomycin with notable success and only 2 recurrences.

The importance of PULMONARY FUNCTION is emphasized by the fact that the New England branch of the American Trudeau Society chose it as the topic for its March 1952 postgraduate course. . . . It was said to be a 'beginner's course', but it is fairly advanced stuff and the technique has proceeded about 30 years beyond the old vital

50 dollars, American money.
capacity test. The fee was fairly modern too, at

Dr. W. Wayne Babcock of Temple University, Philadelphia, writes on the usefulness of STEEL CLOTHS IN SURGERY. . . . The usage is different from what one might expect, and far broader than most would imagine. The material is stainless steel, in a form as soft and pliable as a silk handkerchief. . . . He describes its qualities and grades. He also describes actual and potential uses for it in physical repairs, including eyelids, ears, facial bone defects, the chest wall, aneurysmal sacs, the larynx, hernias, prolapses, flail wrists, joint stabilizations, etc. . . . Amazing versatility.

Dr. Louis T. Regan's useful summaries of the various sections of Forensic Medicine have continued with an article on 'THE LAW OF ABORTION' in the Annals of Western Medicine and Surgery. . . . As usual he presents the law, state by state. Arizona law is average, and conforms to 5 other states and Hawaii in the wording of the law which calls abortion a crime except that which 'is necessary to save the life of the woman.'

The 'PUBLIC HEALTH REPORTS' moves into a new, larger format with Number 1 of Volume 67. It looks very well, with original articles, reporting, and abstracts. . . . Two items of special interest are noted: Dr. Paul Lembcke of Johns Hopkins says that antibiotics, not surgery, are the cause of new cuts in appendicitis mortality. Dr. Hollis Ingraham of New York reports that fluoridation does cut dental caries 60 to 70 per cent. Also, 63 communities in Wisconsin are now fluoridating their water supplies. . . . The journal is not entirely free from propaganda.

The combination of ESTROGEN AND ANDROGEN for menopausal symptoms is now the mode. It has certain advantages, as shown by Greenblatt and his colleagues. . . . Hot flashes and associated symptoms were relieved in 90 per cent of the cases, tho not as often as by estrogen alone. Nausea is rare (4 per cent) compared with that of the estrogen (30 per cent), Uterine bleeding is nearly the same (30 versus 34 per cent). Libido is increased twice as often with both drugs (24 vs. 12 per cent). The acne, hoarseness, and hirsutism, which does not occur with estrogen

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alone, is as frequent with combined therapy (12-13 per cent) as with androgen alone.

Few reports have exceeded 'THE BIG PICTURE', in lucidity and drama. It is the summary and analysis of the huge 1950 Los Angeles County Chest X-Ray Survey. (The total of films was 1,755,001). . . . The story tells how it was started, how it was managed, what the results were, and then coldly suggests the flaws which should be corrected in any similar future attempt.

HILL-BURTON GRANTS STATE OF ARIZONA

The American Medical Association, Washington Office advises that the Division of Hospital Facilities, FSA, reports that as of January 31, 1952, one new project has been approved for Hill-Burton grants in the State of Arizona, as follows:

Casa Grande Valley Hospital in Casa Grande —under construction (new general hospital)— total cost $258,460, federal contribution $23,230.

Status of all Hill-Burton hospital construction in this state is as follows:

COMPLETED AND IN OPERATION: 5 projects at a total cost of $2,540,593, including federal contribution of $732,562 and supplying 195 additional beds.

UNDER CONSTRUCTION: 4 projects at a total cost of $6,886,549, including federal contribution of $1,923,230 and designed to supply 426 additional beds.

$27.5 MILLION SPENT IN FIRST YEAR OF PERMANENT-TOTAL DISABILITY AID PROGRAM

A survey of the first year's operations of the new U. S. program for aid to *totally and permanently disabled needy adults* shows $27.5 million distributed to 28 states, the District of Columbia, Hawaii, Puerto Rico and the Virgin Islands. The program was designed to extend federal assistance to permanently and totally disabled persons between the age of 18 and 65. *Under* 18 they would be eligible for aid as children, *over* 65 as old age assistance cases. The formula provides for federal payment of three-fourths of the first $20 monthly, and one half the balance up to a maximum of $50. Social Security Administration said the new program was "an important factor in reducing the cost of state and locally financed general assistance programs." Emphasis on medical check-ups in the new program, the agency added, "has resulted in many persons learning for the first time that treatment which would remedy or alleviate their condition was available. Some eventual savings in federal and state funds may result from the rehabilitation of these people.

Note: AMA Washington Office Report, January 15, 1952.

AMA DUES CLARIFICATION

A member, dropped for nonpayment of membership dues and who wishes to have his membership reinstated, would owe membership dues for the year in which he became delinquent and the year in which his membership was reinstated, but he does NOT have to pay membership dues for the intervening years.

Here is an example: Dr. Blank was dropped in 1951 for nonpayment of 1950 membership dues. He applies for reinstatement of his A.M.A. membership in 1952. To bring about this reinstatement, he would be required to pay his 1950 membership dues and membership dues for 1952. Membership dues for 1951 would NOT be required.

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FORTY-EIGHTH ANNUAL CONGRESS ON MEDICAL EDUCATION AND LICENSURE

An excellent program, covering many problems in connection with medical education, drew nearly 500 educators, state board officials and members of advisory boards in medical specialties to the 48th annual Congress on Medical Education and Licensure in Chicago's Palmer House the week beginning Feb. 10.

A.M.A. President John W. Cline announced a new plan which promises to be a substantial source of private funds for medical education, warning medical schools at the same time not to become "perpetually dependent on Washington handouts."

He said the A.M.A. Board of Trustees had approved in principle a plan whereby the A.M.A. as a corporation, would accept patients for medical discoveries made by member physicians. All royalties, he said, would be turned over to the American Medical Education Foundation for distribution to medical schools.

"The A.M.A. has appointed a committee to study the technicalities involved," he said, adding: "Provided no legal barrier is encountered, the proposed plan shortly will become a reality."

An increase in medical school enrollment of students from small towns probably would result in a larger supply of doctors in such areas, Dr. H. G. Weiskotten said in addressing the congress. He is chairman of the A.M.A. Council on Medical Education and Hospitals, which sponsored the congress. A recent study of the present location of physicians who graduated from medical schools in 1930, 1935 and 1940 showed that residence before admission to a medical college is, in general, the most potent factor in determining the place of practice, he said.

Dr. Donald G. Anderson, secretary of the council, reported that contributions to the American Medical Education Foundation are gaining in momentum. During 1951, contributions totaling $745,000 were received from 1,811 individual physicians, 33 organizations and 33 lay friends of the medical profession.

Plans for an international conference on medical education were announced by Dr. Louis H. Bauer, secretary-general of the World Medical Association and president-elect of the A.M.A. The meeting will be held in London, August 24-29, 1953. The aim will be: (1) an exchange of ideas; (2) a possible unification of thought; (3) aid to under-developed countries.

"We feel that this will be one of the most important events in medical history," Dr. Bauer said.

Eleven states in the South last year contributed $1,091,500 to a common fund for medical education, it was reported by William J. McGlothlin, Atlanta, consultant for professional programs, Board of Control for Southern Regional Education. The participating states are Alabama, Florida, Georgia, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Texas and Virginia. The schools in the medical program are Duke, Emory, Louisiana State, Tulane, Medical College of Alabama, Vanderbilt, Meharry and the University of Tennessee.

A somewhat similar program is being worked out to cover 11 western states and two territories, it was announced by Dr. Ward Darley, Denver, vice-president of the University of Colorado and dean of its department of medicine. Legislatures of five states—Colorado, Montana, New Mexico, Utah and Oregon—have approved the plan, clearing the way for activation. Other states involved are Arizona, California, Idaho, Nevada, Washington and Wyoming, and the territories of Alaska and Hawaii. The program is expected to be in full swing by the fall of 1953.

Many speakers were on the three day program which also dealt with standards for the approval of residency training programs, the problems of state boards in interstate endorsement and reciprocity, the place of preceptorships in undergraduate medical education, and problems of internships and residencies as related to medical licensure.

NEWS ITEM

Recent Publication.

The Significance of the Prominent Pulmonary Artery Segment.

Marcy L. Sussman, George C. Griffith and George Jacobson.

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